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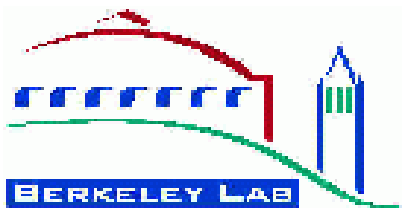
The Power of Teamwork:
JGI Ergonomics Program

Christine Naca, Ira Janowitz, Stephen Franaszek, Ray Turner, Susan Lucas
…and the JGI Ergo Working Group



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Overview

- Description of the JGI
- Review of Production Tasks
- JGI Ergonomics Program
- Ergo Methodology

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DOE Joint Genome Institute

- 250 Staff: 30% LLNL and 70% LBNL
- Mix of research and manufacturing work
- Integrated Safety Management (ISM)
- Stephen Franaszek (LBNL)

Walnut Creek, CA

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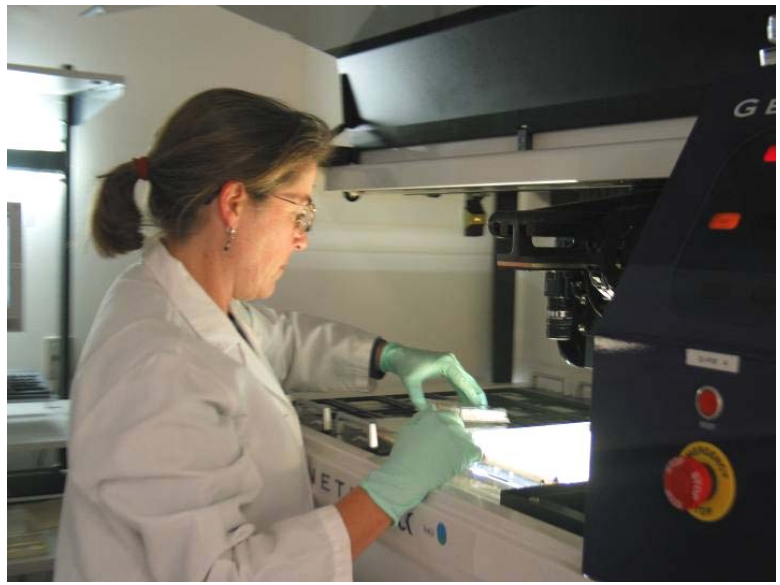
Office & Manufacturing Work Environments

60% staff in computer-intensive office settings



40% staff in hand-intensive production tasks (2 shifts)

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Manufacturing Work Environment

- 40% of the staff make up the manufacturing work environment
- High throughput laboratory manufacturing
- Hand-intensive repetitive tasks
- 32 people, 2 shifts/day

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Production Short Film

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Root Causes of Ergonomic Injuries

- **Equipment/instruments designed for small batches/small lab use now being used for high throughput operation**
- **Culture:**
  - **Understanding Efficiency vs. Speed**
- **High force finger-intensive tasks**

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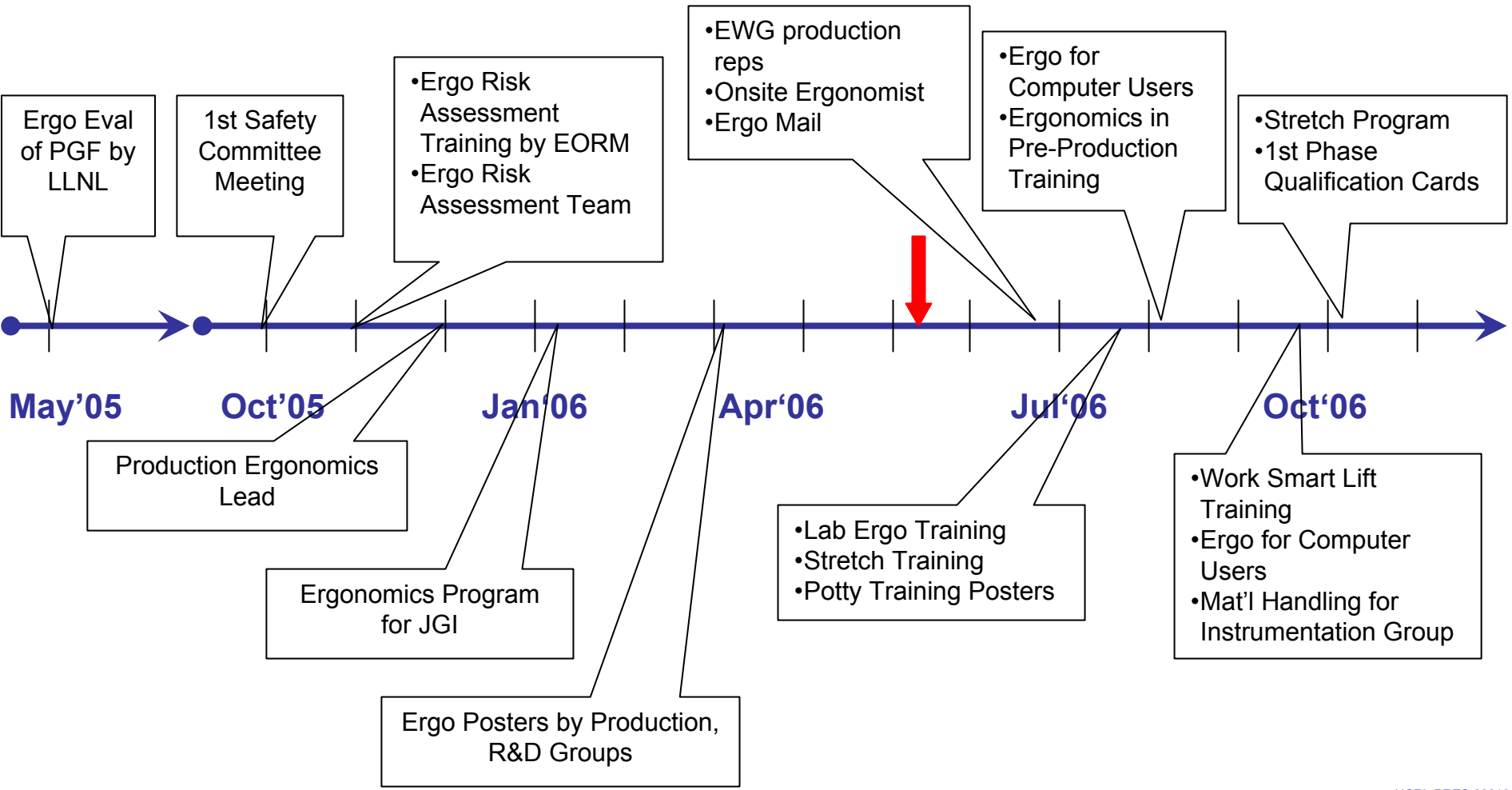
History of Ergonomics at JGI

(May 2005-Current)



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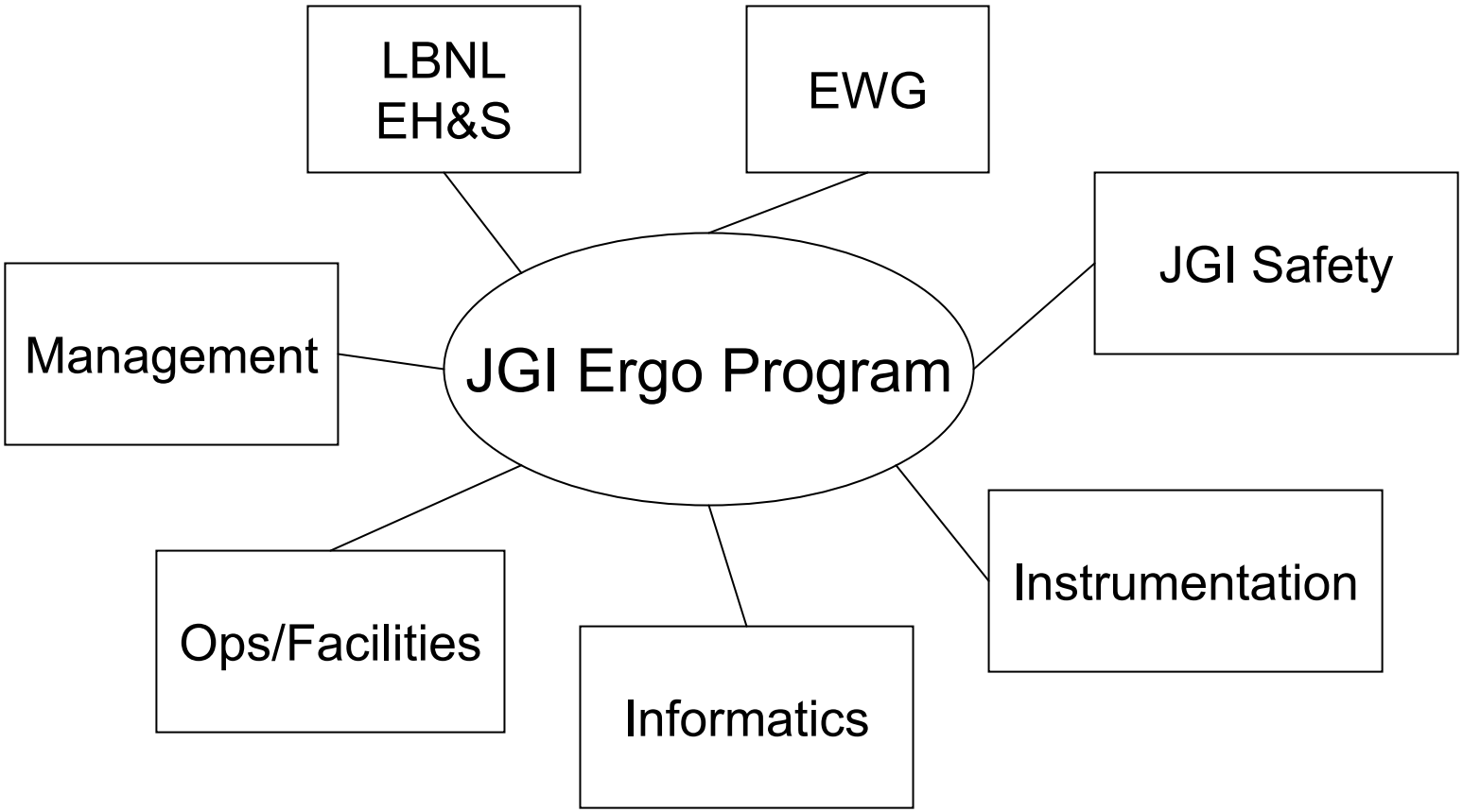
Managing Ergonomics Team Effort



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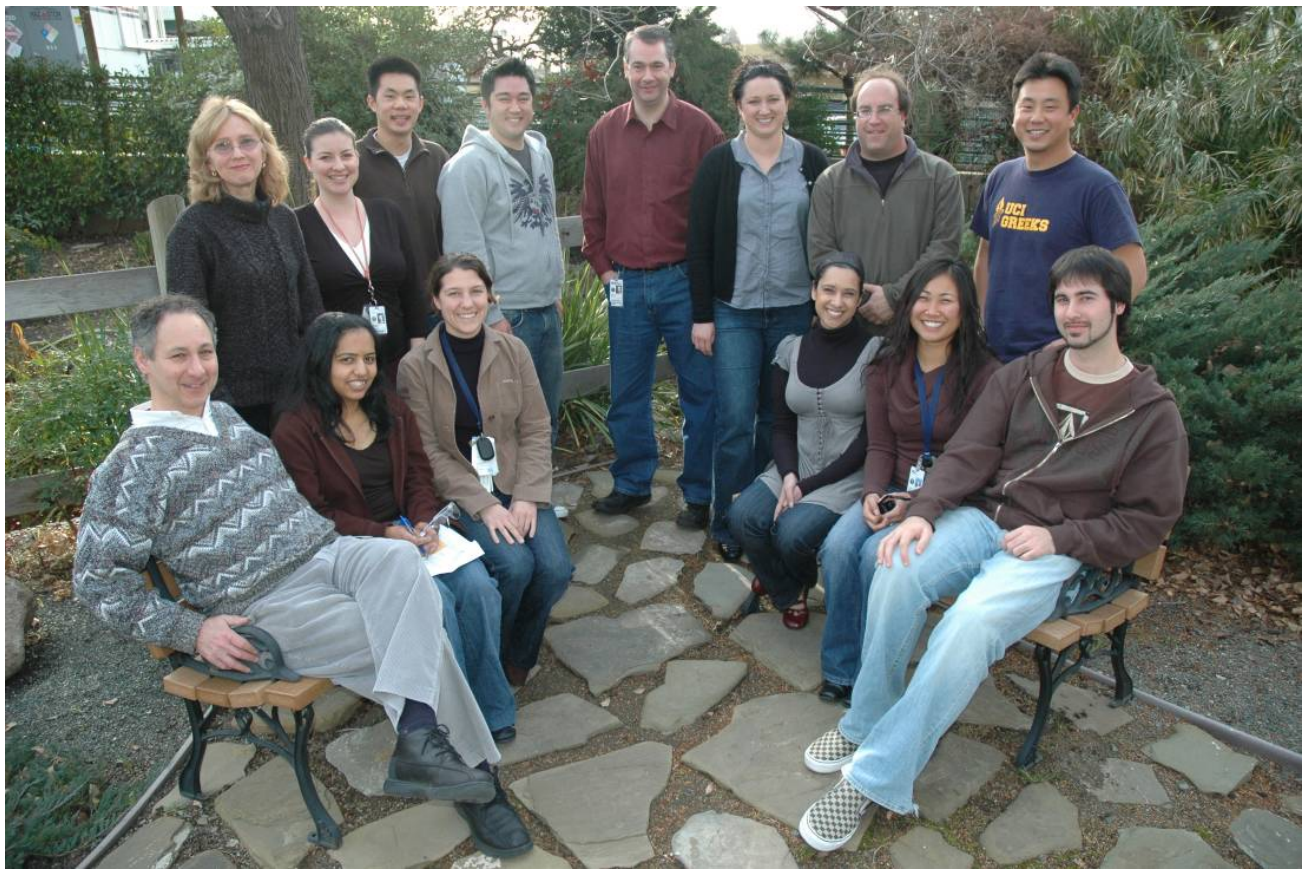
Engaging the Staff

Ergonomics Working Group



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Current Ergo Project Status

Classification	Category	Closed	In Progress	Grand Total
Administrative		48	8	56
Engineering				
	Custom	40	17	55
	Off the Shelf	51	16	65
Grand Total		139	41	180

 # Ergo Projects by Classification

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Shake 'N Plate

Before

After

Administrative:

•Leg Room for seated option

Off the Shelf:

•Lighter plates

•Anti-fatigue Mat

Engineering (custom):

•Fixture to hold the plates

Increased Productivity:

•25% ↑ throughput

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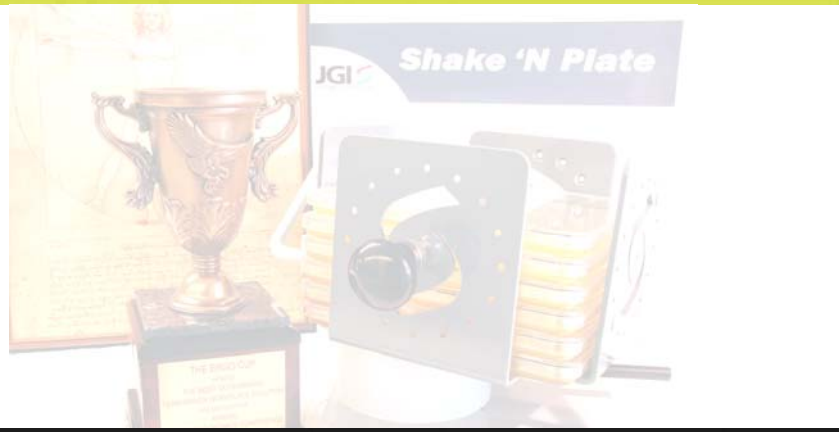
Ergo Cup 2007 Winners
"Team Driven Workplace Solutions"



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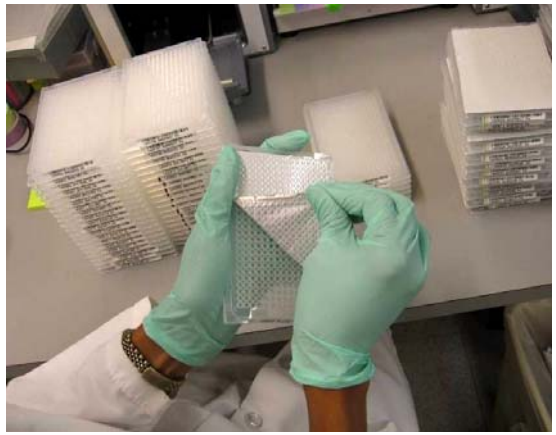
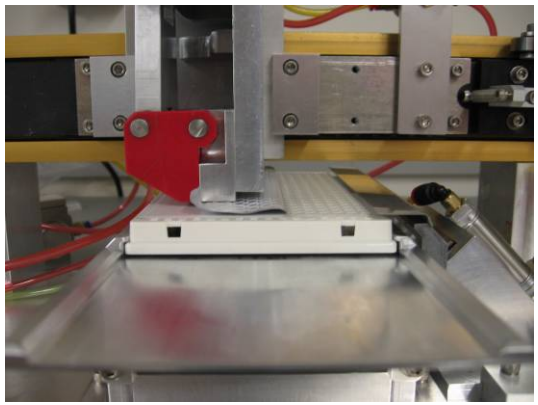
Top 3 High Risk Factor Tasks

Thermal Cycler Loading

Peeling Seals





Freezer Rack Lifting

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Thermal Cycler Loading

Before

After

- 84 Autolid Thermal Cyclers
- Pneumatic Pull-out Shelves & adjusted height.
- Networked the instruments

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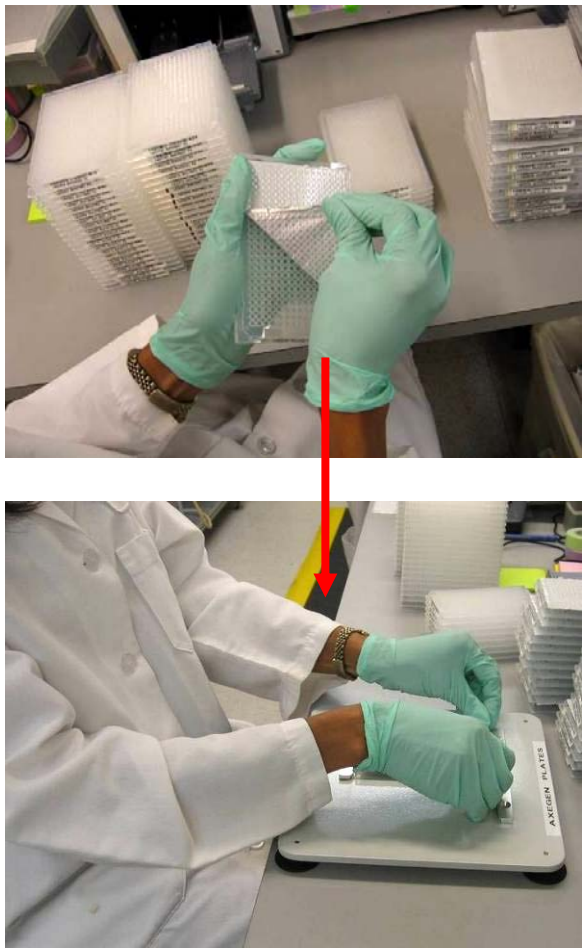
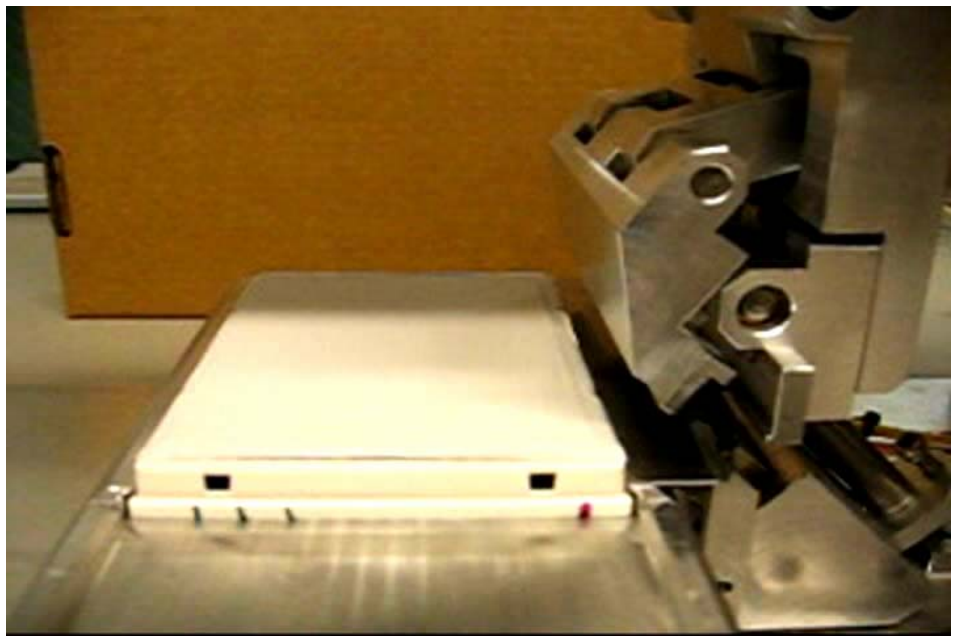
Peeling Seals



Before

- Plate Fixture to hold plates down freeing up both hands to peel
- Ergo Pliers to eliminate the pinch grip while peeling
- Continual Flow eliminates 90% of foil seal peeling
- LBNL custom automated peeler



After

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Freezer Rack Lifting

Before

Height adjustable push/pull cart

<u>Administrative Changes:</u>

- Eliminate use of top shelves (onsite)
- Continual Flow reduced frequency of racking

After

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Production Wide Ergo Improvements

Height-Adjustable & Custom Designed Tables

Before

After

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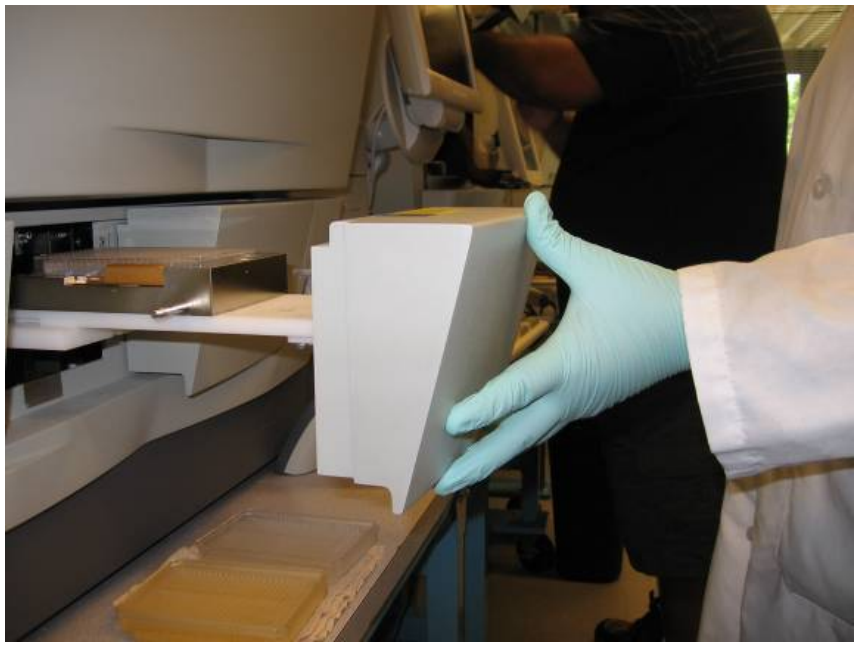
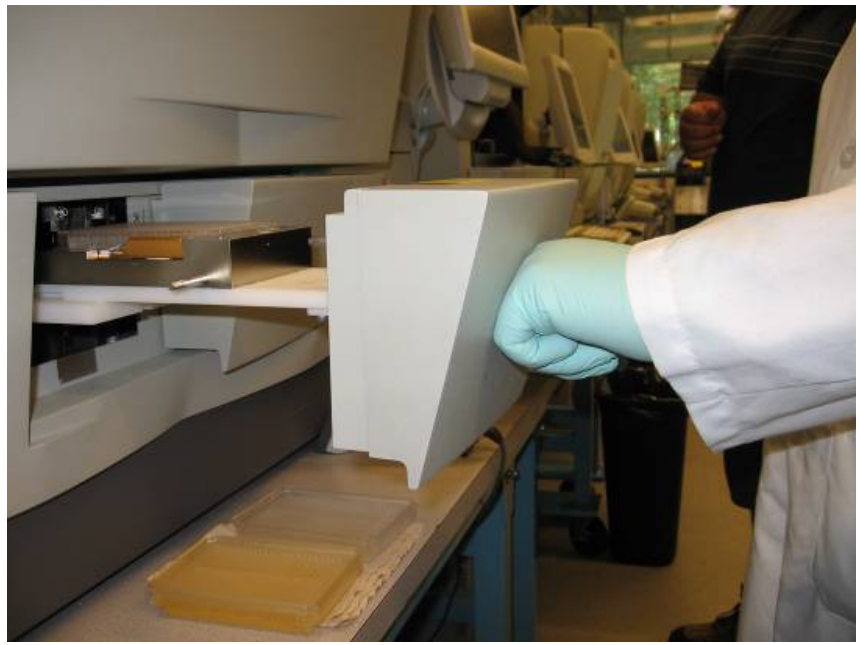
Production Wide Ergo Improvements

Best Practices and Training





Before

After

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Production Wide Ergo Improvements

Anti-Fatigue Mats

Before

After

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The JGI Ergo Program
Why Are We Having Success?

- **Teamwork**
  - **Employee-led Ergonomics Working Group**
  - **Management Commitment**
- **Identify Solutions**
  - **Quick Fix-Administrative Solutions**
  - **Long Term-Engineering Solutions**
- **On-Site Ergo Support**
  - **Rapid Response**
  - **Encourage Early Reporting**
- **Communication/Education**
  - **Group Meetings**
  - **Posters**
  - **Weekly Ergo Email**
  - **Custom Ergo Training Courses**

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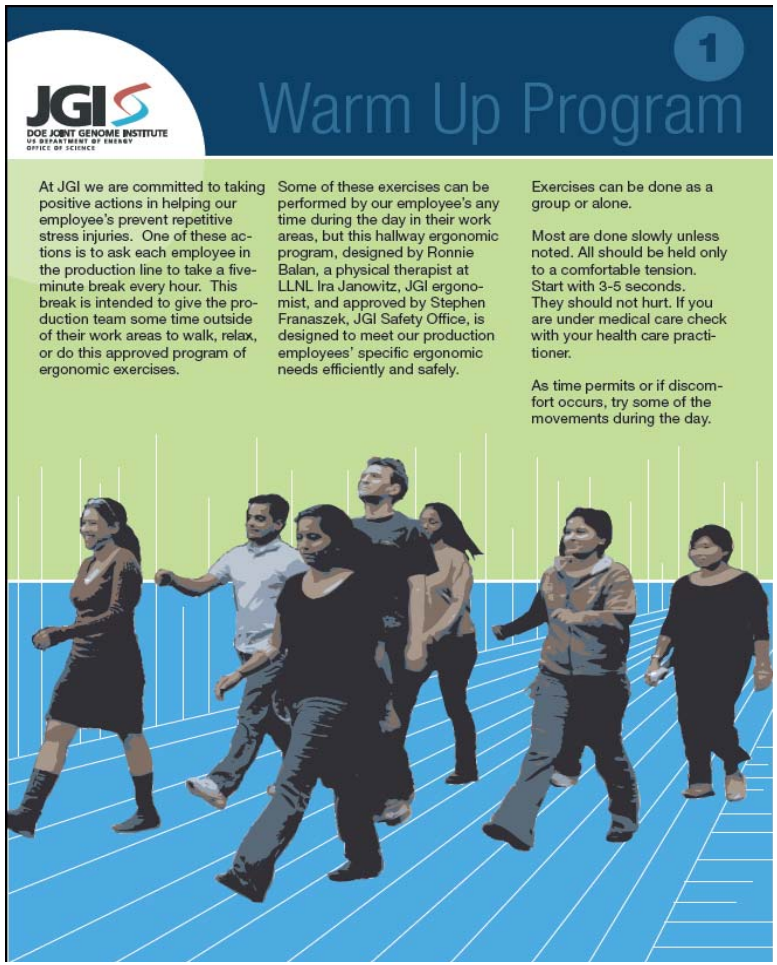
Communication and Education



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Warm Up Program

At JGI we are committed to taking positive actions in helping our employee's prevent repetitive stress injuries. One of these actions is to ask each employee in the production line to take a five-minute break every hour. This break is intended to give the production team some time outside of their work areas to walk, relax, or do this approved program of ergonomic exercises.

Some of these exercises can be performed by our employee's any time during the day in their work areas, but this hallway ergonomic program, designed by Ronnie Balan, a physical therapist at LLNL Ira Janowitz, JGI ergonomist, and approved by Stephen Franaszek, JGI Safety Office, is designed to meet our production employees' specific ergonomic needs efficiently and safely.

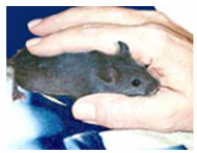
Exercises can be done as a group or alone.

Most are done slowly unless noted. All should be held only to a comfortable tension. Start with 3-5 seconds. They should not hurt. If you are under medical care check with your health care practitioner.

As time permits or if discomfort occurs, try some of the movements during the day.

Stretch Posters

JGI ERGO ROOM



Do you ever experience discomfort from using your mouse because it's too small?

Does your keyboard cause you to bend your wrists into an uncomfortable position?

Did you know that there ARE options available?

The JGI now has an ergonomic demo room available to try out alternatives to your standard keyboard and mouse. We have set-up a computer that will enable you to experience a better workstation layout using a mouse and keyboard that fits your needs. The demo room is located in **building 400, room 405**. If you are interested in trying out any of the equipment, please contact Mike Lee in Safety (ext 5649) or via email at: mdlee@lbl.gov to schedule an appointment.

Potty Training

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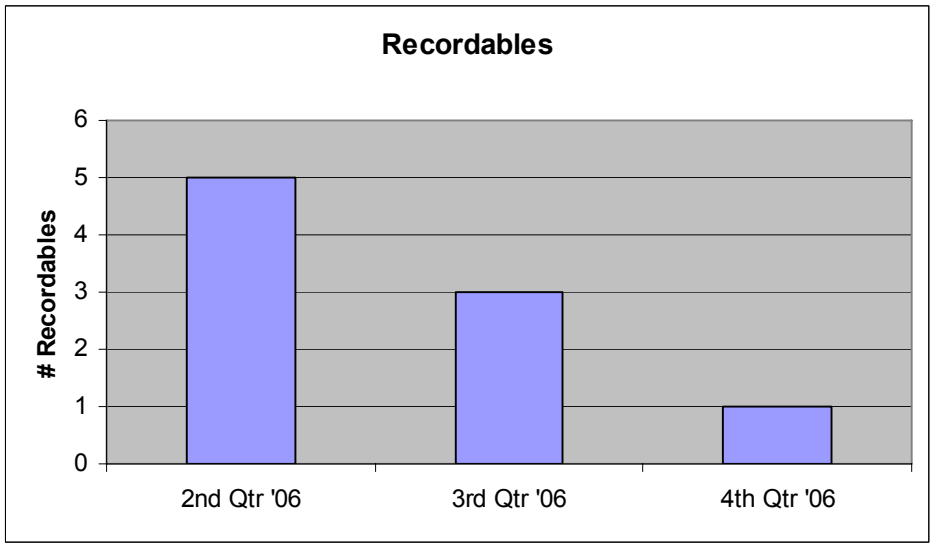
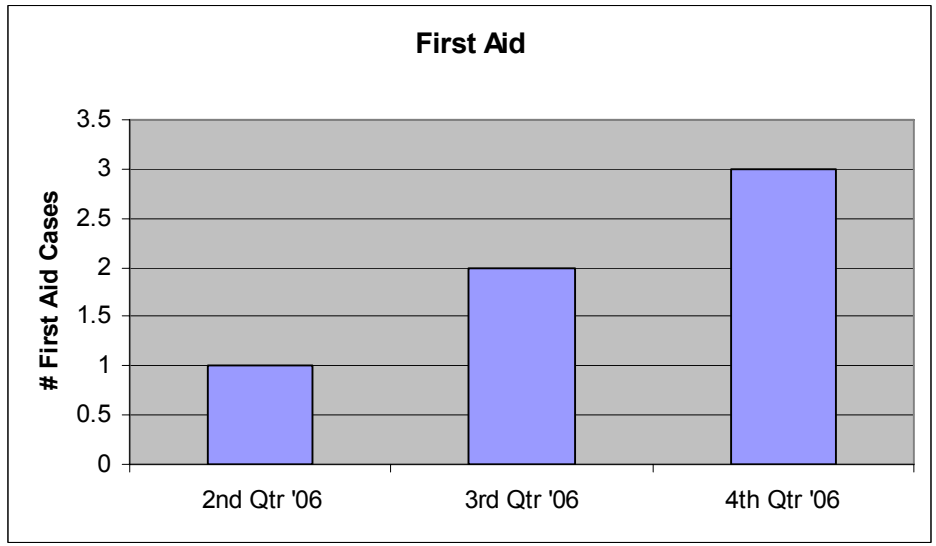
JGI Ergonomic Injury Summary
CY 2006-Current





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Work Pattern Issues

- **Regular Breaks and Lunch**
- **Mix of hand-intensive activities**
- **Overtime practices**
- **Staffing issues**

The production line has been reorganized by shift instead of by work areas. This will better handle staffing shortages and distribute ergonomic risk across different tasks.

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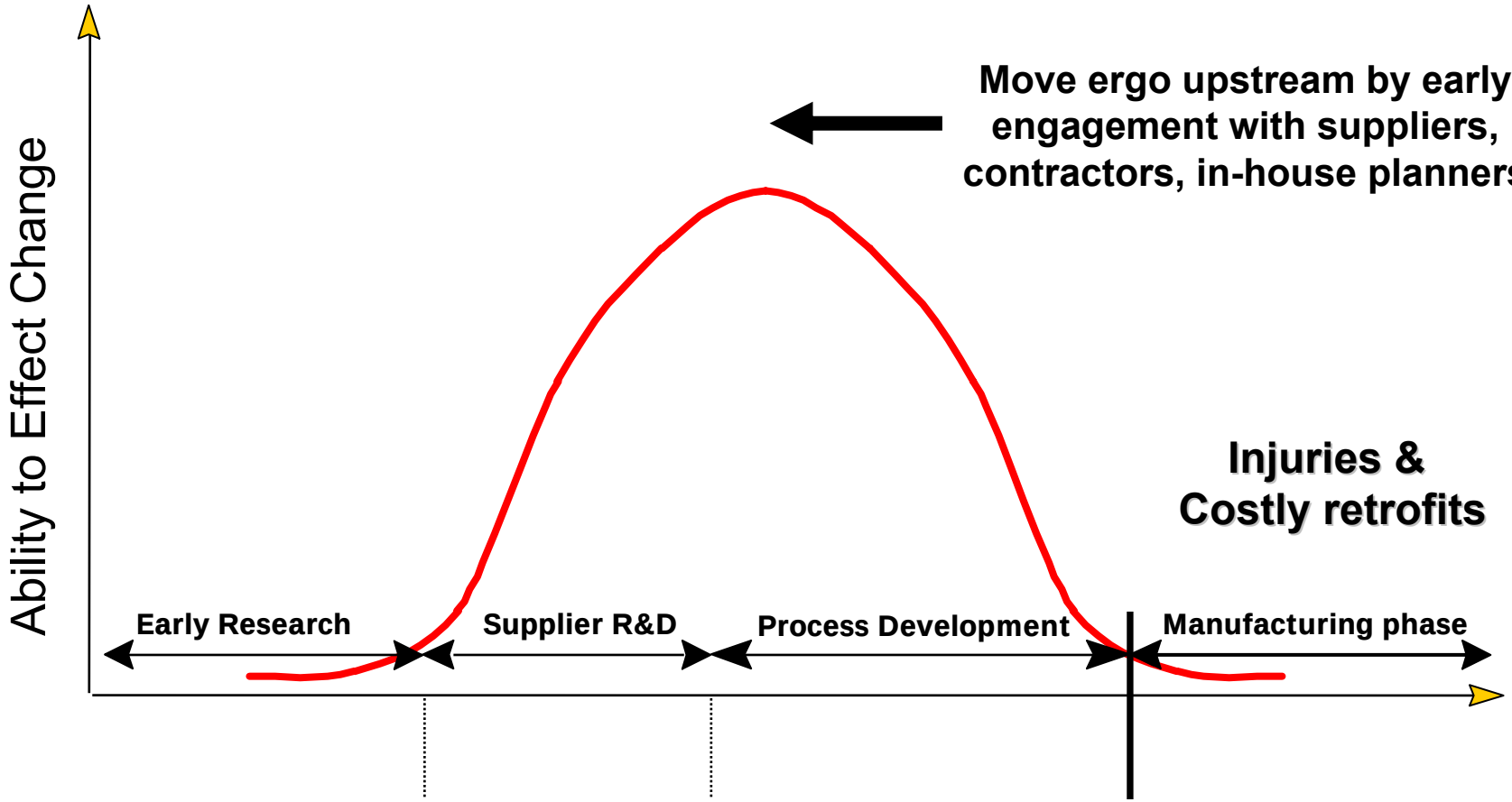
Intel Technology Engagement Model



Low to High Volume Increases Ergonomics Problems

Need to consider duration, repetitiveness + mix of tasks

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Plate Loading

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Ergo Evaluation Techniques

Semiquantitative Assessment Methods

Quantitative Assessment Methods

Moore-Garg Strain Index

- Estimates the risk of injury to the distal upper extremity (elbow and below)
- Integrates risk factors: force, repetition, posture, recovery time, and duration of the day

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Moore-Garg Strain Index

Job / Task: RCA: Peeling Foil Seals

Date: 7/27/2006

Analyst: Christine Naca, Ira Janowitz

SI Score	Interpretation
< 3	Safe
3-5	Uncertain
5-7	Some Risk
> 7	Hazardous

Product of all multipliers

SI = **10.1**

Variable	Rating Criterion	Observation	Variable Multiplier	Enter Multiplier	%Max, MVC
Intensity of Exertion (BS is Borg Scale)	Light	Light: Barely noticeable or relaxed effort (BS: 0-2)	1		<25%
	Somewhat Hard	Somewhat Hard: Noticeable or definite effort (BS: 3)	3		25-35%
	Hard	Hard: Obvious effort; Unchanged facial expression (BS: 4-5)	6		35-55%
	Very Hard	Very Hard: Substantial effort; Changes expression (BS: 6-7)	9	**6**	55-75%
	Near Maximal	Near Maximal: Uses shoulder or trunk for force (BS: 8-10)	13		>75%
Duration of Exertion (% of Cycle)	< 10%		0.5		
	10-29%		1.0		
	30-49%		1.5		
	50-79%		2.0	**1.5**	
	> 80%		3.0		
Efforts Per Minute	< 4		0.5		
	4 - 8		1.0		
	9 - 14		1.5		
	15 - 19		2.0	**1.0**	
	> 20		3.0		
Hand/Wrist Posture	Very Good	Perfectly Neutral	1.0		
	Good	Near Neutral	1.0		
	Fair	Non-Neutral	1.5		
	Bad	Marked Deviation	2.0	**3.0**	
	Very Bad	Near Extreme	3.0		
Speed of Work	Very Slow	Extremely relaxed pace	1.0		
	Slow	Taking one's own time	1.0		
	Fair	Normal speed of motion	1.0		
	Fast	Rushed, but able to keep up	1.5	**1.5**	
	Very Fast	Rushed and barely/unable to keep up	2.0		
Duration of Task Per Day (hours)	<1		0.25		
	1 - 2		0.50		
	2 - 4		0.75		
	4 - 8		1.00	**0.25**	
	> 8		1.50		

Note: This worksheet was adapted and interpreted by the USF investigators. No warranty is offered.

Reference: J. Steven Moore & Arun Garg, The Strain Index: A Proposed Method to Analyze Jobs For Risk of Distal Upper Extremity Disorders; Am. Ind. Hyg. Assoc. J. 56:443-458 (1995)

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How much is too much?

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JGI Production Environment

- **Complex, heterogeneous mix of tasks → difficult to track and control ergo risk exposure**

- **Supervisors need guidelines for assigning workload within safe parameters**

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In Summary

- **Collaborative Effort**
- **Continuous Improvement**
- **Proactive and Participatory Ergonomics Program**

Results:

- **Improved Employee Morale**
- **Decreased Recordable Injuries**

This work was performed under the auspices of the US Department of Energy's Office of Science, Biological and Environmental Research Program, and by the University of California, Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48, Lawrence Berkeley National Laboratory under contract No. DE-AC02-05CH11231 and Los Alamos National Laboratory under contract No. DE-AC02-06NA25396.

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